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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/820,072	03/28/2001	Wen-Yen Hwang	PAT004	4037

27543 7590 03/11/2003

APPLIED OPTOELECTRONICS, INC.
13111 JESS PIRTLE BLVD.
SUGAR LAND, TX 77478

EXAMINER	
NGUYEN, JOSEPH H	
ART UNIT	PAPER NUMBER
2815	9

DATE MAILED: 03/11/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/820,072	HWANG, WEN-YEN	
	Examiner	Art Unit	
	Joseph Nguyen	2815	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *07 January 2003* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-15 and 39-45* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-15 and 39-45* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☒ The proposed drawing correction filed on *07 January 2003* is: a)☒ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in-
> (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or
> (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

Claims 1-15 and 39-41,43-45 are rejected under 35 U.S.C. 102(e) as being anticipated by Hwang et al.

Regarding claim 1, Hwang et al discloses on figure 2 a substrate comprising a base substrate 12; an interfacial bonding layer 16 disposed on the base substrate; and a thin film adaptive crystalline layer 14 disposed on the interfacial bonding layer wherein the interfacial bonding layer is solid at approximately room temperature and in liquid like form when above room temperature; the thin film adaptive crystalline layer 14 has a degree of flexibility to expand or contract its lattice constant along a direction parallel to a surface of the substrate when the interfacial bonding layer is in liquid like form; and the base substrate is mechanically strong enough to support the interfacial bonding layer and the thin film adaptive crystalline layer thereon.

Regarding claim 2, Hwang et al discloses on figure 2 the thin film adaptive crystalline layer 14 comprises approximately the same crystalline lattice structure as

$In_x(Al_yGa_{1-x})_{1-x}$ As where x is approximately 15% to approximately 45% (col. 8, lines 4-5).

Regarding claim 3, Hwang et al discloses on figure 2 the substrate comprises a substrate for formation of a vertical cavity surface-emitting laser based on $In_x(Al_yGa_{1-y})_{1-y}$ As.

Regarding claim 4, Hwang et al discloses on figure 2 X is approximately 15% to approximately 45%.

Regarding claim 5, Hwang et al discloses on figure 2 above room temperature comprises a temperature of approximately 80C to approximately 600C.

Regarding claim 6, Hwang et al discloses on figure 2 thin film adaptive crystalline layer 14 comprises InGaAs with an In composition between approximately 15% and approximately 45% (col. 8, lines 4-5).

Regarding claim 7, Hwang et al discloses on figure 2 the thin film adaptive crystalline layer 14 comprise a compound semiconductor.

Regarding claim 8, Hwang et al discloses on figure 2 the compound semiconductor comprises InP, GaAs, GaSb or InAs (col. 3, lines 40-45).

Regarding claim 9, Hwang et al discloses on figure 2 the base substrate 12 comprises a semiconductor, an inorganic material or a combination thereof.

Regarding claim 10, Hwang et al discloses on figure 2 the semiconductor comprises GaAs, InP, GaP, Si or Ge.

Regarding claim 11, Hwang et al discloses on figure 2 the interfacial bonding layer 16 comprises a single layer of the same material or multiple layers of different materials.

Regarding claim 12, Hwang et al discloses on figure 2 the single layer of the same material or the multiple layers of different materials comprise Bi, In, Pb, Sn, Al or Ni; or a metal alloy; or inorganic materials.

Regarding claim 13, Hwang et al discloses on figure 2 the interfacial bonding layer 16 comprises multiple thin metal film wherein some of the films comprise liquid like form at a temperature above room temperature, and some of the films remain solid at the temperature above room temperature.

Regarding claim 14, Hwang et al discloses on figure 2 the temperature above room temperature comprises a temperature of approximately 80C to approximately 600C.

Regarding claim 15, Hwang et al discloses on figure 2 the expansion or contraction of the lattice constant accommodates material epitaxial growth.

Regarding claims 39-41,43-45, Hwang et al discloses on figure 2 all the structure set forth in the claimed invention.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claim 42 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hwang et al as applied to claim 35 above.

Regarding claim 42, Hwang et al discloses substantially all the structure set forth in the claimed invention except above room temperature comprising a temperature of approximately 80C to 600C. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Hwang et al by having above room temperature comprising a temperature of approximately 80C to 600C for the purpose of improving the performance of a semiconductor device, since it has been held that where the general conditions of a claim are disclosed in the prior art discovering the optimum or working ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.

Response to Arguments

Applicant's arguments filed on 1/7/2003 have been fully considered but they are not persuasive.

Applicant argues that there is no suggestion that the bonding interface 16 of Hwang et al is solid at approximately room temperature, and in liquid like form when above room temperature; nor that a thin film adaptive crystalline layer is disposed on the interfacial bonding layer and having a degree of flexibility to expand or contract its lattice constant along a direction parallel to a surface of the substrate when the interfacial bonding layer is in liquid like form. However, Hwang clearly discloses on

figure 2 that the bonding interface 16 is solid at approximately room temperature, and in liquid like form when above room temperature. In a semiconductor device, the bonding interface 16 is inherently solid at room temperature and is in liquid like form at above room temperature since this bonding interface would naturally be solid at room temperature and melt (liquid like form) at above room temperature (its melting point). Further, Hwang clearly discloses on figure 2 a thin film adaptive crystalline layer 14 is disposed on the interfacial bonding layer and having a degree of flexibility to expand or contract its lattice constant along a direction parallel to a surface of the substrate when the interfacial bonding layer is in liquid like form. Note that the expansion or contraction of a material merely depends on the hot or cold temperature that is applied upon the material. Therefore, this thin film adaptive crystalline layer is inherently having a degree of flexibility to expand or contract its lattice constant along a direction parallel to a surface of the substrate when the interfacial bonding layer is in liquid like form.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Joseph Nguyen whose telephone number is (703) 308-1269. The examiner can normally be reached on Monday-Friday, 7:30 am- 4:30 pm

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie Lee can be reached on (703) 308-1690. The fax phone numbers for the organization where this application or proceeding is assigned is (703) 308-7382 for regular communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

JN
March 7, 2003

EDDIE LEE
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800